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Studies in the Asclepiadaceae.—II.

BY ANNA MURRAY VAIL.

I.—A REVISION OF THE GENUS ACERATES IN THE UNITED STATES.

The genus Acerates was first established by Elliott, in 1817, and based on the species now known under the name of *Acerates Floridana* (Lam.) Hitchcock, but the author doubts at the same time whether the absence of the horn-like appendage constitutes a sufficient character to separate it from *Asclepias.*

In 1834 Nuttall named the genus *Polyotus,* claiming that the name *Acerates* had been already used for another genus and includes in it four species. Rafinesque treated the genus variously in 1836, but altogether too vaguely to be noticed seriously. Since then the species have been transferred from one genus to another. Bentham and Hooker placed them with *Ananthertix* under *Gomphocarpus* and in the Kew Index they are so indicated. In K. Schumann's revision of the Family in Engler and Prantl's *Natürlichen Pflanzenfamilien,* it is included with *Otaria* Kunth and *Anantherix* Nutt. in the genus *Asclepias.*

Dr. Gray, in his several studies of the North American *Asclepiads,* kept *Acerates* distinct, which seems in every way the most satisfactory and logical thing to do. The following description of the genus is enlarged to include that anomalous and much discussed species, *Asclepias stenophylla,* and a new species, *Acerates Rusbyi,* which seem to be the connecting links between the genera with horned hoods and those with unappendaged hoods.

ACERATES Elliott, Bot. S. Car. & Ga., 1: 316. 1817.

[POLYOTUS Nutt. Trans. Am. Phil. Soc. 5: 199. 1834.]

[* OLIGORON Raf. New Fl. Am. 4: 60. 1836.]

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* Acerotis Raf., 1817, in New Fl. Am. 1: 49, 1836, is given as a synonym of *Acerates* and is there changed to *Otanema.* In New Fl. 4: 60, 1836, *Oligoron* is also made synonymous with *Acerates* and includes two species; one of which is probably *Acerates Floridana* in part; the other species *O. tenuifolium* might possibly refer to *Acerates auriculata* Engelm. The genus *Otanema* Raf. l. c. 4: 61, apparently refers to forms of *Acerates viridiflora.* I do not know the 1817 reference to *Acerotis.*

[OTANEMA Raf. l. c. 61. 1836.]

Erect or procumbent perennial herbs. Stems simple or branched. Leaves opposite, alternate or scattered. Inflorescence umbelliform, sessile or peduncled, terminal and lateral, several to many-flowered. Peduncles subtended by numerous involucral bracts. Flowers greenish or occasionally purplish-tinged. Calyx small, 5-parted, the segments acute, usually bi-glandulose at the sinus. Corolla rotate, deeply 5-parted, the segments small, reflexed in anthesis. Column very short, not always apparent, with commonly 5–10 small glands or processes alternating with the anther-wings. Hoods mostly attached over the whole of the column, erect, equalling or shorter than the anthers, involute-concave and somewhat pitcher-shaped, often pendulous and saccate at the base, entire, emarginate or 2–3-lobed or toothed at the apex, the ventral margins spreading towards the base into broad auricles or small infolded concealed lobes, either destitute of horns or crests or in two species with rudimentary ones. Anther-wings angulate about or somewhat below the middle, narrowed and rounded towards the base or rarely of the same width from the apex downwards, entire or notched. Follicles on erect or recurving pedicels. Otherwise as in *Asclepias.*

Seven species are known from the United States and three more are said by Eugène Fournier (Ann. Sci. Nat. Ser. 6, 14: 386. 1882.) to occur in Mexico.

Key to the Species.

- Auricles of the hood when present concealed within.
  - Umbel solitary, terminal. 1. *A. lanuginosa.*
  - Umbels several, lateral, (in no. 2 occasionally terminal).
    - Hoods rounded, much shorter than the anthers, entire at the summit. 2. *A. Floridana.*
    - Hoods entire, rounded or acutish at the summit, as high as the anthers. 3. *A. viridiflora.*
    - Hoods 2-parted at the summit, the divisions lanceolate. 4. *A. bifida.*
- Auricles of the hood conspicuously spreading; umbels lateral.
  - Hoods emarginate or truncate at the summit, crestless within. 5. *A. auriculata.*
  - Hoods 3-lobed at the summit, with an internal crest-like midrib, terminating in the middle lobe. 6. *A. angustifolia.*
  - Hoods truncate and entire at the summit, with an obscure, thin horn attached to the keel of the hood and nearly reaching its apex. 7. *A. Rusbyi.*

1. ACERATES LANUGINOSA (Nutt.) Dec.; DC. Prodr. 8: 523. 1844.

Asclepias lanuginosa Nutt. Gen. 1: 168. 3 Ap. 1818. Not H.B.K. 1818.

Asclepias Nuttalliana Torr. Ann. Lyc. N. Y. 2: 218. 1828. Not A. Gray, Man. Ed. 2, 352 and 704. 1856.

Polyotus lanuginosus Nutt. Trans. Am. Phil. Soc. 5: 200. 1834.

Acerates monocephala Lapham; A. Gray, Man. Ed. 2: 704. 1856.

Hirsute-pubescent throughout with weak spreading hairs. Stems erect, angled, 1-3 dm. high; leaves opposite or some of them alternate and scattered, very short-petioled, oblong-ovate to lanceolate, 4–7 cm. long, obtuse or acutish or sometimes with a rounded base; umbel terminal, solitary, mostly many-flowered; corolla greenish, the segments 4 mm. long; column obsolete; hoods shorter than the anther-wings, oblong, almost petaloid, entire, solid up the base of the anther-wings, the obtuse apex sometimes recurved backwards, the ventral margins infolded with a small concealed auricle toward the base; accessory processes small, obtuse; pollinia 1.2 mm. long, attenuate upwards; anther-wings salient and obtusely angled towards the base, entire; follicles on recurving pedicels. Mature fruit not seen.

Prairies, Wisconsin and Northern Illinois to Missouri at White River (Nuttall); Yellowstone (Allen); "On the Canadian" (James). Summer.

Illustration: Britt. & Brown, Ill. Fl. 3; *f. 2928.* 1898. Ined.

2. ACERATES FLORIDANA (Lam.) A. S. Hitchcock, Trans. St. Louis Acad. 5: 508. 1891.

Asclepias Floridana Lam. Encycl. 1: 284. 1783.

Asclepias incarnata Walt. Fl. Car. 106. 1788. Not. L. 1753.

Acerates longifolia Ell. Bot. S. C. & Ga. 1: 317. 1817.

Polyotus longifolius Nutt. Trans. Am. Phil. Soc., Ser. 2, 5: 200. 1834.

Oligoron longifolium Raf. New Fl. Am. 4: 60. 1836. ?

Minutely scabrous-pubescent, becoming glabrate. Stems erect or ascending, 3–8 dm. high or more; leaves linear to elongated linear-lanceolate, 7–16 cm. long, 3–1.5 cm. wide; umbels 2 or 3-several, usually many-flowered; peduncles 5 mm. to 4 cm. long; pedicels slender, 1–1.3 cm. long; corolla-segments oblong, about 3 mm. long, dull purple on the outer surface; hoods purplish, oval, obtuse, slightly pendulous at the base, ventral margins entire, adnate at the base to the upper part of the distinct column, rising to about the middle of the anthers; anther-wings angled at the middle, tapering to the longer base; follicles erect on recurved fruiting pedicels, fusiform, 7–10 cm. long, minutely puberulent; seeds 7 mm. long; coma 3–4 cm. long.

Prairies and wet pine barrens and swamps, Wisconsin and Ohio to Florida and Texas. June to September.

Very variable as to height, width and length of foliage, and also length of peduncles. The Florida form has a more distinctly terminal inflorescence and longer peduncles. A specimen from Louisiana with lanceolate leaves has peduncles 5–7 cm. long, and was collected by Dr. Ingalls at New Orleans in 1834. The Western form has sessile or very short peduncled umbels and more truly lateral inflorescence. There seem to be, however, no differences in the flowers.

Illustration: Britt. & Brown, Ill. Fl. 3: *f. 2926.* 1898. Ined.

Michigan: Mr. Wright. 1838. *Illinois:* Dr. Scannon; Winnebago Co., M. S. Bebb, 1871; Hillsgrove, Holton, 1850. *Missouri:* St. Louis, Engelm.; Jasper Co., B. F. Bush, no. 244, 1893. *Arkansas:* Nuttall. *South Carolina:* St. John's, Porcher. *Georgia:* Darien Junction, McIntosh Co., J. K. Small, 1895. *Louisiana:* Alexandria, Hale. *Florida:* St. Marks, Rugel, 1843; St. Augustine, Miss Reynolds, 1877; Chapman.

3. ACERATES VIRIDIFLORA (Raf.) Eaton, Man. Ed. 5, 90. 1829.

Asclepias viridiflora Raf. Med. Rep. (2) 5: 360. 1808.

Polyotus heterophyllus Nutt. Trans. Am. Phil. Soc. 5: 199. 1834.

Tomentose-puberulent, becoming glabrate. Stems ascending, 2–6 dm. high, often procumbent; leaves opposite or some of them scattered, short-petioled, 4–6 cm. long, oval or oblong, obtuse and retuse or acutish, usually mucronate, sometimes with undulate margins, becoming thick and coriaceous; umbels globose, sessile or nearly so, 2–5 or more, lateral, densely many-flowered; pedicels 1 cm. long or less; corolla-segments oblong-lanceolate, about 5 mm. long; hoods inserted over the whole short column, dull purplish, or at least tinged with purple, erect, nearly equalling the anthers, lanceolate-oblong, entire, except for a pair of small infolded and concealed auricles at the base; accessory processes 5; anther-wings salient above the middle, semi-rhomboid, entire, or possibly obscurely notched, tapering toward the base; pollinia 2–5 mm. long, attenuated to the short caudicles; follicles

6–10 cm. long, erect on recurved pedicles, fusiform, attenuate, glabrous or minutely puberulent; seeds 7 mm. long; coma 2.5–3 cm. long. Very variable and intergrading with the two varieties.

Dry and sterile soil, New England to Saskatchewan, southward to Florida, Texas, New Mexico and North Mexico. June to September.

Illustrations: Torr. Fl. N. Y. **2**: *pl. 88.* 1843. In part. Hook, Fl. Bor. Am. **2**: *pl. 143.* 1844. In part. Britt. & Brown, Ill. Fl. 3; *f. 2924.* 1898. Ined.

Forms with broadly oval or oblong, obtuse or retuse leaves.

New York: Torrey; Staten Island, T. H. Kearney, Jr. *Pennsylvania:* Conewago Co., Small, 1889. *Georgia:* Boykin; Gwinnett Co., Small, 1893. *Texas:* Kerrville, Heller, no. 1913, 1894. *New Mexico:* Wright, no. 1693. In part.

Forms with broadly oblong, acute or acutish leaves.

Nebraska: Wilcox, 1888; Banner Co., Rydberg, no. 231, 1891. *Kansas:* Fort Riley, E. E. Gayle, 1892; Osborne Co., C. L. Shear, no. 102. 1894. *Illinois:* Augusta, S. B. Mead, no. 1043. *Arkansas:* Nuttall. *North Carolina:* Rowan Co., Heller, no. 125. 1890. *Florida:* Marianna, Chapman. *Louisiana:* Alexandria, Hale; Carpenter, no. 43. *Texas:* San Diego, Miss Croft.

ACERATES VIRIDIFLORA IVESII Britt., Mem. Torr. Club, 5: 265. 1894.

Asclepias lanceolata Ives, Am. Journ. Sci. **1**: 252. 1819. Not Walt. 1788.

Asclepias viridiflora var. *lanceolata* Torr. Fl. N. Y. 284. 1844.

Acerates viridiflora var. *lanceolata* Torr. in A. Gray, Syn. Fl. **2**: Part I., 90. 1878.

Leaves lanceolate, 5–10 cm. long, often much elongated; anther-wings tapering rather more abruptly at the base. Otherwise as in the type, with the same range and occurring with it.

Illustrations: Ives, Am. Journ. Sci. **1**: 252. 1819. Torr. Fl. N. Y. **2**: *pl. 88.* 1843. In part. Hook. Fl. Bor. Am. **2**: *pl 143.* 1844. In part.

Rocky Mountains: Frémont, 1842. *Nebraska:* A. B. Show; Banner Co., Rydberg, no. 232, 1891; Plummer Ford, Rydberg, no. 1306, 1893. *Kansas:* Fort Riley, no. 519, 1892. *Illinois:*

S. B. Mead. *Connecticut:* New Haven, Professor Ives (type). *Virginia:* Lynchburg, Britton, 1892. *Kentucky:* Collector unknown. *Georgia:* Small, 1893. *Louisiana:* Alexandria, Hale.

ACERATES VIRIDIFLORA LINEARIS A. Gray, Syn. Fl. 2: Part I., 99. 1878.

Stems low; leaves linear, elongated, umbels often solitary Intergrades with the last. Said to occur from Minnesota and Manitoba to the Northwest Territory, south to Louisiana and New Mexico.

Missouri: B. F. Bush, no. 361, 1894. *Louisiana:* Alexandria, Hale.

4. ACERATES BIFIDA Rusby; A. Gray, Proc. Am. Acad. 20: 296 1885.

In general appearance resembling the narrower leaved forms of *Acerates viridiflora.* Stems angled when dry, somewhat swollen at the nodes, puberulent; internodes 1.5–2.5 cm. long or more; leaves broadly lanceolate, 3.5–7 cm. long, 15 mm. wide or more, acute at each end, coriaceous, tomentulose, with a distinct marginal vein; umbels apparently many, lateral, sessile, globose, many-flowered; pedicels 1–1.5 cm. long, filiform, tomentulose; corolla-segments 5 mm. long, lanceolate, acute; anther-mass 4 mm. high; hoods erect, attached over the whole short column, shorter than the anthers, 2-parted for nearly half their height, the segment tapering but obtuse, the ventral margins infolded towards the bas- and entire except for a minute notch at the attachment; anther-wings salient above the middle, the angle entire, rounded and tapering towards the base; follicles not seen.

Collected only once by H. H. Rusby, in Arizona, probably in Yavapai County in 1883. A single specimen is preserved in Herb. Gray.

5. ACERATES AURICULATA Engelm. Bot. Mex. Bound. Surv. 160. 1859.

Asclepias auriculata Holzinger, Bot. Gaz. 17: 125 and 160. 1892. In part.

Glabrous and glaucous from a branched? rootstock. Stems 2–8 dm. high, mostly solitary, sinuous above when old and rarely branched; leaves alternate-scattered, numerous and sometimes crowded, narrowly linear or filiform-linear, 5–14 cm. long, the scabrous margins not always revolute, becoming thick, coriaceous and often twisted with age; peduncles 5 mm.–2 cm. long, and with the 1 cm. long, slender pedicels and numerous slender involucral bracts, minutely puberulent; umbels many-flowered, lateral, 1 or 2, sometimes 16 on the same stem; column very short; calyx-segments minutely puberulent; corolla-segments greenish, tinged with dull purple on the outside, about 4 mm. long; hoods yellowish, with often a purplish keel, erect, crenately truncate or emarginate at the apex, the involute sides spreading at the base into broad, obscurely crenate auricles; anther-mass globose, anthers narrow and of equal width, entire or possibly notched and twisted at the middle, incurved over the anthers at the summit, the intermediate spaces marked by a verticle dark purple line; follicles erect on reflexed fruiting pedicels, about 8 cm. long, obliquely fusiform, acute, glabrous; seeds 6 mm. long, very thin; coma 2 cm. long.

Rocky ground and prairies, Nebraska, Kansas and Colorado to New Mexico and southern Texas. June to September.

Nebraska: Banner Co., Rydberg, no. 230. *Kansas:* Dodge City, Smyth, no. 164, and Caldwell, no. 273; "Kansas River," Frémont, 1845. *New Mexico:* Wright, no. 1687; Copper Mines, Mex. Bound. Surv., Bigelow; White Mts., Norton, 1895. *Texas:* Kerrville, Kerr Co., Heller. no. 1868 (distributed as *Acerates stenophylla*).

Illustration: Britt. & Brown, Ill. Fl. 3: *f. 2924.* 1898. Ined.

6. ACERATES ANGUSTIFOLIA (Nutt.) Decne.; DC. Prodr. **8**: 522. 1844.

Polyotus angustifolius Nutt. Trans. Am. Phil. Soc., Ser. 2, **5**: 201. 1834.

Asclepias stenophylla A. Gray, Proc. Am. Acad. **12**: 72. 1876.

Asclepias auriculata Holzinger, Bot. Gaz. **17**: 125 & 160. 1892. In part.

Stems mostly several from the same stout tuberous root-stock, erect, straight. 3–6 dm. high, clothed with a minute, mostly retrorse puberulence, becoming glabrate below; leaves alternate, scattered or some of the lower ones opposite, sessile, narrowly linear, 5–12 cm. long or more, glabrous, the revolute margins and thick midrib scabrous beneath; umbels small, 10–15-flowered, short-peduncled or subsessile, lateral, 7–13 or more on the same stem; pedicels 7–10 mm. long, minutely spreading or retrorse-pubescent; corolla-segments 5 mm. long, oblong, obtuse or acutish, greenish; hoods white, attached over the whole of the short column, erect, as high as the short anthers, laterally compressed, 3-dentate at the apex, the acute central tooth merely a prolongation of the thickened crest-like midrib and much shorter than the erect, obtuse lateral ones, at the base concave and gibbous, each inner margin spreading into an erosely truncate lobe which usually overlaps that of the next hood and terminates in an interior ring of five 2-lobed minute processes or appendages between the anthers; anther-wings salient and conspicuously auriculately notched slightly below the middle, narrowed at the base; follicles slender-fusiform, straight, erect on erect fruiting pedicels, about 8 cm. long, 6–7 mm. wide, acute, minutely pubescent; seeds about 5 mm. long, thin; coma 3 cm. long. (*Nothacerates* A. Gray.)

Dry sandy prairies, Nebraska, Kansas and Colorado to north Texas. June to September.

Illustration: Britt. & Brown, Ill. Fl. 3: *f. 2925*. 1898. Ined.

Nebraska: Thomas Co., Rydberg, no. 1420. *Kansas:* Arkansas River, Frémont, 1845; Fort Riley, E. E. Gayle, no. 518; W. E. Rusby, 1878; Manhattan, M. A. Carleton; Manhattan, Norton, 1892. "*Arkansas:*" Nuttall, in Herb. Columbia University.

7. ACERATES RUSBYI sp. nov.

Glabrous up to the inflorescence, glaucous. Stems erect, stout, solitary? 6–8 dm. high or more, from a slender, branched rootstock; leaves linear to filiform-linear, 8–17 cm. long, 2–5 mm. wide, sessile, acute at the apex, rather distant, approximated in whorls of 3 above, scattered-alternate and sometimes in threes below; peduncles 1–3.5 cm. long; umbels many-flowered, lateral, solitary or in pairs; pedicels about 1 cm. long and with the numerous involucral bracts minutely puberulent; corolla-segments 4–5 mm. long, dull purple on the outside, greenish on the inner surface; column short but distinct; hoods erect, yellowish, with a darker or purplish? midrib or keel, shorter than the anthers, concave, truncate at the apex, auricled below the middle at the slightly infolded ventral margin; horn very slender, weak, transparent, arising from the base of the keel of the hood and but rarely reaching its apex; anther-wings salient and notched near the base. Follicles not seen.

With the general appearance of *A. auriculata*, but very easy to distinguish by the more regular disposition of the leaves, the shorter hoods and the obscure horns, which appear merely as a detached and free midvein or keel. Oak Creek, Arizona, June 23, 1883, collected by H. H. Rusby and distributed as *Acerates auriculata* Engelm.; Williams, Arizona, collected by Toumey, no. 249, June 28, 1892 (in U. S. Nat. Herb.).

The specimens here quoted, are, with one or two exceptions, preserved in the Herbarium of Columbia University. I am indebted to Prof. Underwood and to Dr. Small for much help and many valuable suggestions; to Mr. P. A. Rydberg for copious notes on *A. auriculata* and *A. stenophylla*, and to Dr. B. L. Robinson for the loan of type specimens for examination.

II.—THE SYNONYMY OF ASCLEPIAS CURTISSII AND OTHER NOTES.

ASCLEPIAS CURTISSII A. Gray, Proc. Am. Acad. 19: 85. 1883.

Asclepias aceratoides Nash, Bull. Torr. Club, 22: 154. 1895. Not M. A. Curtis, 1849.

Asclepias arenicola Nash, Bull. Torr. Club, 23: 252. 1896.

In a recent number of Pittonia (3: 224. 1897), Prof. Greene proposes a new genus based on *Asclepias arenicola* Nash, which is only a synonym of a species long previously described by Dr. Gray and but little known. The section in which this species is placed in the Synop. Fl. 2: Part 1, 402, is somewhat misleading, and the heading, 2. "Leaves alternate," has apparently been understood as including also *A. Curtissii*, which it should not on careful study of the key in the main work.

Prof. Greene claims that the plant in question out of flower could be taken for nothing but an *Acerates*. That is undoubtedly so, but that could also be said of several other species of *Asclepias* and certainly out of flower, unless very familiar to the collector, most, if not all, the species of *Acerates* could readily be put in *Asclepias*. The bi-auriculate, hastate, clawed base of the hood, which Prof. Greene notes as one of the characters of his new genus *Oxypteryx*, occurs also in our two common and well-known field species, *Asclepias tuberosa* and *A. decumbens*, species which also have entire anther-wings. *Asclepias Hallii* Gray, another little known plant, also has hoods with hastate clawed bases and entire or obscurely notched anther-wings. The triangular, almost sagittate anther-wings of *Asclepias Curtissii*, are undoubtedly an interesting variation from the usual types; but it scarcely seems to me that they are sufficiently strong characters on which to establish a genus.

The specimens of *Asclepias Curtissii* which I have examined are the following from Florida: Curtiss, 1879 (type) and Hillsboro Co.

Curtiss, 1886, in Herb. Gray; Titusville, A. H. Curtiss, Distr. N. Am. Pl. no. 2279; Manattee, J. H. Simpson, 1889; Nash. no. 1092, 1894; Nash. no. 1814, 1895. In all these specimens preserved in the Herbaria of Harvard University, U. S. Nat. Mus. and Columbia University, the umbels are on peduncles varying from 1–5 cm. in length and there is no evidence of their being subsessile.

In the same issue of Pittonia, on page 233, Prof. Greene claims that the notch of the anther-wing is an invariable character of *Acerates*, when, as a matter of fact there are species with and without notched anther-wings. Those without notches are *Acerates lanuginosa*, *A. viridiflora* and its two variations, *A. bifida* and commonly *A. auriculata*, the latter however occasionally with small notches, and very peculiar and nearly unique anther-wings. They are very narrow, not salient at the middle, but of about equal width from top to bottom, the margins apparently flattened and meeting up the middle. The remaining North American species have notched anther-wings. The notch is evidently a very variable character, often so on the same plant.

Prof. Greene asserts that the inflorescence of *Acerates* is strictly lateral. On the contrary in *Acerates lanuginosa* the solitary umbel is always terminal. In *A. Floridana*, the species on which the genus was based, there are occasionally a solitary or two terminal umbels.